

Consortium for Electric Reliability Technology Solutions

Real-Time Grid Reliability Management Presented by Carl Imhoff

DOE Transmission Reliability Program Review

May 20, 2002

Arlington, VA

Discussion Topics

1. Vision and Objectives
2. Roadmap for research, demonstrations and dissemination
3. Past Accomplishments
4. FY02 Program Elements



CERTS – Real-Time Grid Reliability Management

Vision/Goal: *Transform the electric grid to an automatic switchable network*

Research Objectives

- Identify current operational requirements/assess the suitability of current operational tools and security schemes for wide control areas operated in market-driven conditions;
- Develop, test, and evaluate new real-time performance monitoring, reliability adequacy, and security analysis schemes, tools, and operational procedures along with corresponding real-time control technologies based on advanced measurements;
- Demonstrate the above tools, schemes , and controls utilizing ISOs, RTOs, and utilities as test beds;
- Improve information visualization systems and their availability, so that operators can rapidly understand and react to developing system problems in new market-based operational environments; and
- Pursue a dissemination strategy to accelerate introduction of the operational tools and processes by making them readily available to industry.

Real-Time Grid Reliability Management

**Operational
Decision Support
Tools and
Visualization**

**System Security
Management Tools**

GOAL: AUTOMATIC SWITCHABLE NETWORK

Advance Measurements and Controls



**Development, and
Demonstrate Reliability
Adequacy Tools:**

- VAR Management
- Ancillary Services Perform.
- Wide-Area Information Visualization
- Reliability Compliance Performance (ACE,AIE,etc)

1999-2002

**Security and
Congestion
Assessment Tools:**

- Integrated Security Analysis
- Congestion Management
- Cascading and Self Organized Criticality Utilization

2001-2003

**Dispatcher and Operating
Engineering Applications
Using Synchronized Phasor
Measurements:**

- Monitoring & Post Disturbance Tool
- Enhance Stability Nomograms
- Standard, Low Cost, Reliable Phasor Technologies
- Validation of Stability Models

2000-2004

**Prototype New
Real Time
Controls**

Automated adaptive control strategies based upon real-time data monitoring

2001-2008

CERTS – Real-Time Grid Reliability Management

Report Card

Funding: \$2,900K through FY01

Accomplishments

- Functional and design requirements for grid reliability tools 1999
- White paper on Real-Time Monitoring and Control 1999
- Developed conceptual models and demos for real-time reliability tools 2000
- Piloting ACE and AIE monitoring systems at NERC 2001
- Delivered measurement-based disturbance toolset to CAISO 3Q01/1Q02
- Industry use of WAMs dynamic data for WSCC system and
model validation 2001
- Support two major WSCC staged tests and post-disturbance analyses 2001
- Implement VAR management solutions system at CAISO 2001

CERTS – Real-Time Grid Reliability Management

FY02 RTGRM Activities: \$1,800K

Key Projects/Deliverables:

- Build on an extend NERC ACE/AIE platforms
 - Add CPS1, CPS2, DCS performance indices
 - Participate in development of new performance indices for security coordinators
 - Contribute enhancements to Real Time Security Data Display
- Continue outreach and dissemination of Real-Time System Adequacy Tools and Synchronized Phasor Measurement Workstations
 - Extend to more partners e.g., AEP, TVA, WAPA
- Continue WAMs outreach in WSCC and eastern interconnections
- Continue baseline investigations of “feasibility of real-time grid control”

CERTS Research Road Map

	PROBLEMS					
	Real Time Data Overload	Outages	Voltage Collapse	Frequency Excursions	Congestion/ TLR	Reserves Adequacy
Technology Solution	Visualiza- tion Tools – Graphic & Geographic	Phasor Measure- ment System	Voltage Manage- ment System	ACE Monitor	Trans-mission Manager	Frequency Regulation
Research	1999/2000	2001	1999/2000	2001	2001	2001
Prototypes	2001	2001/2003	2001	2002	2003	2001/2002
Demonstrations	2001	2002/2003	2001/2002	2002/2003	2003/2004	2001/2002
Dissemination	2002	2005	2003	2003	2005	2003

CERTS Demonstrations

- **CAISO** - California Independent System Operator - Voltage Mgmt. & Reserves
- **NERC** - North American Electric Reliability Council - Frequency (ACE/AIE)
 - In beta test with 7 Security Coordinators and utilities including: TVA, SPP, MISO, VACAR North, IMO, CISO, Rocky Mt./Desert system
- **AEP** - American Electric Power - Outages With Phasor Measurement
- **WAPA*** - Western Area Power Administration - Visualization
- **TVA*** - Tennessee Valley Authority - Outages With Phasor Measurement
- **NEISO*** - Northeast Independent System Operator - Frequency
- **NYISO*** - New York Independent System Operator - Frequency
*Under Discussion